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ABSTRACT

In order to calibrate a vocabulary base which might be utilized in preparing materials for reading instruction at the elementary level, the 1000 most frequently used words in the preschooler's vocabulary provided the experimental data for several studies: (1) a series of free-recall experiments which yielded a scaling of common words according to availability, (2) a rating of the image-evoking capacity of the words by 34 undergraduates, and (3) a rating for associative strength by 55 undergraduates. Finally, 39 preschool S's were employed while establishing hierarchies of associations for 160 of the 1000 words. (Appendixes contain (a) 1000 words scaled as to recall, imagery, and association, and (b) hierarchies of associations to 146 common, regularly spelled words.) (Author/RD)

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FINAL REPORT

Project No. 9-0279

Grant No. OEG 7-9-530279-0122

COLLECTING A DATA BASE FOR A READING TECHNOLOGY

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ABSTRACT

The research reported here is a continuation of Project No. 9-0279 and the Final Report of that project (January 1971) should also be consulted, but for the convenience of the reader, much of its Introduction is repeated in the present Final Report.

The specific objective of the effort is to collect a data base which will lay the foundation for a technology of elementary reading instruction.

More generally the objective is to provide a model for education similar to the one that has proved effective for scientific agriculture. In that field, agricultural experiment stations transform knowledge from chemistry by performing experiments that measure the effect of a particular chemical upon a particular crop in a particular soil. Similarly, in the field of reading, since there are no mathematical operations that transform data from verbal learning experiments into tables useful to an educational technician, the experiments themselves must be replicated upon relevant populations; e.g., by studying six-year-olds memorizing the sounds of letters.

Two such transforming studies were described in the Final Report of the previous year. A continuation of one of them and three additional ones are described in the present report:

Scaling Learnability by Free-Recall. A series of free-recall experiments were continued using the 1000 most frequently used words as stimuli. These studies provided a scaling of common words according to response availability.

Image-Evoking Capacity. The same 1000 words were rated for image-evoking capacity by 34 undergraduates.

Associative Strength. The 1000 words were also rated for associative strength by an additional 21 undergraduates.

Thus, each of the 1000 most frequently used words in the preschooler's vocabulary---the words that account for over 90% of his production---have been calibrated for the three characteristics that have most effect upon learning them. These calibrations can be used in conjunction with measures of stimulus discriminability to select the most effective list to use in teaching look-say learning.

Hierarchies of Word Associates. Using 39 preschoolers as Ss, hierarchies of associations were collected to 160 of the words.

1

I

INTRODUCTION

The specific objectives of the research program reported here are twofold: (1) to collect a data base for a reading technology, and (2) to begin a study of verbal learning through an experimental analysis of reading behavior.

A more general purpose of the program is to provide a model for educational R & D similar to the one which has proved so effective for scientific agriculture. In that field, agricultural experiment stations perform the experiments necessary to transform scientific knowledge into products and systematic tables useful to the agronomist. Similarly, an educational experiment station in reading would generate a systematic set of tables that could be used by the reading engineer to develop instructional materials.

An Educational Experiment Station in Reading

In a recent monograph (Coleman 1970), it was noted that the current state of affairs in education bears a strong resemblance to that of agriculture in the early 1800's. For a century or so, advances in chemistry and biology had exerted little effect on field-crop production. The steady growth in farm production did not begin until agricultural experiment stations, instigated by Boussingault in the 1830's, began measuring the effects of particular chemicals on particular crops in particular soils.

Although other enterprises, such as engineering and medicine have, like agriculture, succeeded in applying the findings of basic science, education has been less efficient in adapting scientific knowledge to its special requirements. The relation between education and its underlying sciences requires that the scientific knowledge be transformed before any appreciable amount of educational engineering will be possible.

An engineer manipulates numbers or measures in order to predict what will happen when analogous manipulations are performed upon things. Knowledge from the physical sciences can be transformed by means of straightforward mathematical operations into the tables of precise measures required by the engineer. The sciences most relevant to reading instruction are linguistics and the psychology of verbal learning, and psychology, at least, is

organized in terms of hypothetical constructs and intervening variables. For example, most of the systematic data concerning the transfer effects of language habits has been organized under such hypothetical constructs as meaningfulness (m), unit-sequence effects, functional fixedness, etc. Such data are of little use to the reading engineer who needs to know, for instance, the transfer effects of a specific English spelling rule when, for instance, a six-year-old sounds out a given irregular word. To be of use to the reading engineer, knowledge couched in the form of hypothetical constructs must be transformed into tables of precise measures that can be manipulated to predict the behavior of a child in a learning situation.

Unfortunately, the experiments that generated knowledge of interest to reading were usually performed with college sophomores as subjects and with nonsense syllables as stimuli. There are no straightforward mathematical operations for transforming such data, and thus, no tables which scale the words, graphemes, phonemes, spelling rules, phonic rules, and other language units which comprise elementary reading programs. At present, the publishers and writers who design reading programs can make only crude assumptions about the characteristics of their materials.

An Educational Experiment Station in Reading, analogous to the ones which prove so successful for scientific agriculture, could serve as an answer to the dilema facing designers of reading programs. The goal of such an experiment station would be to provide tables that calibrate the language units that compose reading programs by replicating experiments on populations of direct interest to reading--on six-year-olds memorizing letter-sound associations, on children learning to read common words from flashcards, on children learning to print. The experiment station would, in effect, provide a data base that would be used to engineer instructional programs. Once such a data base of systematic measures becomes available, engineering breakthroughs can be expected for the simple reason that manipulating numbers is more efficient than manipulating things.

The Data Base

A recent monograph (Coleman 1970), detailed the research strategy to be followed in collecting the data base for a reading technology. This strategy is summarized in the following sections.

1. S-R Analysis of Reading Behavior. The first step in this strategy calls for the analysis of reading behavior into skills each of which is simple enough to yield to experimental measurement. The monograph gave a partial listing of the skills a child must master in learning to read, the skills being conceptualized as a matrix of S-R functions. The S-term represents stimulus variables--language characteristics that affect reading behavior. The R-term represents psychological techniques for measuring reading skills--trials to memorize letter-sound associations, reaction time for reading particular words, phonic blending, etc.

2. The Broadband Experiments. Step two of the research strategy consists of a series of broadband experiments each of which rank-orders a set of language units according to a gross skill of reading.

Coleman (1970) reported the findings of four such broadband studies. Using kindergarteners as subjects these studies scaled common words for learnability, graphemes for ease of learning their sounds, the English sounds for phonic blendability, and the letters for ease of printing.

There were two major reasons for starting with broadband experiments. First, these experiments provided data of immediate use to designers of elementary reading programs. They identified the language units most easily learned by children, i.e., the ones which should be introduced early when the child is struggling to understand the concepts of reading. Second, the broadband experiments sketched the data base in broad outline and suggested a strategic sequence for the studies to follow.

3. The Narrowband Experiments. Each of the skills of reading can be analyzed into finer detail by taking into account the variables which affect the learnability of that skill. For example, Skill 1, the look-and-say learning of whole words, can be conceptualized as ordinary paired associate learning. Underwood and Schulz (1960) have shown that PA learning can in turn be analyzed into three stages: (1) discriminating the stimuli from one another, (2) making the response available in the learner's repertoire, and (3) pairing the stimuli and responses appropriately.

Such detailed analyses suggest narrowband studies that can isolate the variables that determine why language units rank-order as they do. The third step of the research strategy outlined here is to perform a matrix of narrowband experiments each of which plots a reading response as a function of a stimulus dimension. Chapter II of the previous year's report describes one such study which rank-orders words according to response availability, and the present report describes three additional narrowband studies.

II

NARROWBAND STUDIES OF RESPONSE AVAILABILITY

One of the skills a child must master in learning to read is the look-and-say learning of whole words. Look-and-say learning can be conceptualized as ordinary paired-associate learning with the printed word being the stimulus and the child's saying the word being the response. As discussed in Chapter I, look-and-say learning can be analyzed in finer detail by taking into account the three stages of PA learning proposed by Underwood and Schulz, i.e., stimulus discrimination, response availability, and the pairing of stimulus and response. A narrowband study concerned with Stage 2 of this analysis, response availability, was described in the previous year's final report. Additional data were collected this year. A brief description of rationale and method follow; a more complete description of the method was given last year.

Rationale

Educators often accept frequency of occurrence as an estimate of response availability. An experiment reported by Coleman (1970) shows, however, that frequency is a poor estimate, at least for the first few hundred words a child learns. In that experiment, the effect exerted by word class far outweighed any effect due to frequency.

The simplest way to measure response availability is through the use of free recall. Items are presented and the S is requested to recall as many as possible with no order constraints upon him. If certain items are found to be recalled with a high frequency by most children, then it can be assumed that these same items will be readily available as responses in learning S-R associations.

In order to compile a rank ordering of words according to response availability, an experiment on the recall of the most frequent 1,000 words was carried out with 50 five-year-old children in El Paso, Texas last year. Each S was tested for 10 days and on each day received 13 or 14 lists of 16 items each. Only the recall from the middle eight words in each list was tabulated in order to reduce contamination from primary and recency effects. Furthermore, to eliminate any biases due to a favored serial position or fortuitous interword associations with any one list, word lists were

Table 1. 1000 Words Ranked According to Recallability, Imagery, and Association Value

Recall		Imagery		Association Value	
Santa Claus	57	Santa Claus	6.824	girl	6.524
bowwow	55	eggs	6.794	mother	6.429
Daddy	52	ambulance	6.735	summer	6.333
Santa	51	apples	6.735	automobile	6.238
automobile	50	football	6.735	Dad	6.190
kindergarten	49	ball	6.706	fruit	6.190
Halloween	49	book	6.706	mouth	6.190
Judy	48	chair	6.706	woman	6.190
bunny	46	ocean	6.706	boy	6.143
Nancy	46	cat	6.676	ocean	6.143
popcorn	46	cow	6.676	spring	6.143
reindeer	45	eyes	6.676	Grandfather	6.095
baby	45	lion	6.676	Santa Claus	6.095
Grandma	45	sun	6.676	tree	6.095
God	45	dress	6.647	vegetables	6.095
Merry-go-round	45	flowers	6.647	animals	6.048
Mama	44	house	6.647	church	6.048
policeman	44	rabbit	6.647	hospital	6.048
pumpkin	43	Santa	6.647	book	6.000
Jack-O-Lantern	42	bananas	6.618	Christmas	6.000
doctor	41	butterfly	6.618	Father	6.000
*		*		*	
*		*		*	
*		*		*	
though	5	would	1.382	by	2.048
want	5	am	1.353	what	2.048
was	5	aren't	1.353	whose	2.048
were	5	be	1.353	hardly	2.000
before	4	so	1.353	it's	2.000
much	4	the	1.353	while	2.000
said	4	which	1.353	that's	1.952
there's	4	are	1.324	else	1.857
what	4	could	1.324	than	1.857
add	3	else	1.324	ought	1.810
of	3	or	1.294	hasn't	1.762
yet	3	though	1.294	of	1.762
second	2	ought	1.265	as	1.714
should	2	as	1.206	I'd	1.667
that's	2	because	1.176	the	1.667
		of	1.176		

generated by computer with a different word order for each S. Two replications of this experiment were also performed last year; one in Charleston, West Virginia, and one in Clemson, South Carolina.

This year a third replication was conducted in Hattiesburg, Mississippi, and the data were pooled with those of last year.

Results

The results of all four studies are given in Column 2 of Appendix I. The figure in Column 2 is the number of children who recalled the word out of a possible 108 (the total children in the four studies).

An intuitive grasp of the characteristics that affect recallability can be gained most quickly by studying the first column of Table 1. There the most frequently recalled 20 words are rank-ordered with the least recalled 15.

Even such a casual study of the list will suggest that some form of meaningfullness is partly responsible for recallability. As a matter of fact, the other columns in Table 1 give image-evoking capacity and associative strength, two commonly accepted measures of meaningfullness and their correlations with recallability are .60 and .54 for these 1,000 words.

As one studies the words, he may uncover subclasses within nouns and verbs that may affect response availability. Nouns that denote animate objects (kitten, cow, milk) appear to be easier to recall that those that do not (time, week, law). Verbs that combine with a large number of verb particles to form new verbs (get up, get out, get in, get down, etc.) are harder to learn than those that do not. Transformational grammar can provide formal criteria for defining these subclasses and second-level narrowband studies can measure the differences in learnability between them.

Table 2. Correlations of the Four Replications

	E.P.	W. Va	Clemson	Mississippi
El Paso	1.000	.626	.305	.493
West Virginia		1.000	.297	.515
Clemson			1.000	.261

The correlations between the four separate replications are given in Table 2. The correlations may not appear particularly high, but remember that they are based on relatively small numbers of scores, only 9 in the Clemson replication. The split-half reliability of the recall index based upon all 108 scores is .87, acceptable enough when one considers that sampling variance from experimenters, localities, and experimental procedures are included in the data.

III

NARROWBAND STUDIES OF PAIRING STIMULUS WITH RESPONSE

A reconstruction task is a fairly direct way to measure the ease with which a person can learn to pair a stimulus with its appropriate response. The learner is given a set of stimuli--say English words printed on cards--and a set of responses--say foreign words printed on cards--and asked to pair the cards appropriately. Pairing the cards involves little stimulus discriminability or response availability, and thus the task is essentially a measure of ease of pairing.

A reconstruction task for pairing printed words with their spoken counterparts could probably be devised, but since it presents considerable difficulties, we will skip the first-level narrowband study, and proceed to the second-level, scaling each word according to characteristics that affect this stage of learning. The two most obvious characteristics are association value and image-evoking potential.

Ratings of Association Value and Image-Evoking Potential. Ratings of both association value and image-evoking potential were obtained for the 1,000 most frequently used words with the procedure of Paivio, Yuille, and Madigan (1968). That is, college students were asked to rate each word as to the amount of images (or associations) they thought it would arouse. A seven-point scale was used, with one representing low and seven representing high values of both dimensions.

Subjects. The 1000 words were rated by university undergraduates, 21 Ss rating them for association value and 34 rating them for imagery.

Method. Each S was given a printout of the words arranged in random order, each S having a different random order. They rated the first 200-300 words under close supervision to assure that they understood the nature of the task and then they took the printouts home and completed the ratings within seven days. The exact instructions used by Paivio, Yuille, and Madigan were read to the Ss except that the words "association value" were substituted for "imagery" for the 21 Ss rating along that dimension.

Results

An overall picture of the relation between recallability, imagery, and association value can be gained from Table 1 where the

top 20 and the bottom 15 words are rank-ordered for each measure. In Appendix 1, the entire 1,000 words are given with each measure.

The split-half reliability of the imagery ratings is .94, and that of the association value ratings is .89.

There are 114 nouns that also occur in the listing of Paivio, et al. These are all frequently occurring nouns, and thus the range of their ratings is quite restricted, 96 of them having an I rating above 6.00. In spite of the restricted range, the correlation with my rating is .92. Apparently, undergraduates can rate words for image-evoking capacity quite reliably.

The correlation for these 114 nouns between my rated association value and the m values of Paivio, et al is considerably lower, only .463. The major reason for the low correlation is the restricted range, of course. Correcting for the restriction gives a predicted r of .73 (unrestricted standard deviation = 1.06, restricted standard deviation = .512). The difference in methods also lowers the r; Paivio, et al did not obtain their m values by ratings, but by the production method.

The relation between rated imagery, rated association value, and recallability is apparent by comparing the three rank-orderings of Table 1. The correlations of I with AV was .90, of I with R was .60, and of AV with R, .54.

IV

HIERARCHIES OF ASSOCIATIONS TO THE WORDS

Ratings on a word are useful, but a hierarchy of its actual associations (or images) would be considerably more useful to an Educational Experiment Station in Reading. Such a hierarchy would suggest sentences to use when the word is first introduced, and it might also suggest mediators that tie the printed shape of the word to its meaning.* Image hierarchies to a few words are being collected, but they are too fragmentary to justify reporting at this time. It is worthwhile, however, to describe association hierarchies that are available for the 160 words that were scaled in the broadband study (Coleman, 1970).

One could collect a hierarchy of associations to each word using either the continuous or discrete association technique. When working with young children, a variation of the continuous association method developed by Newman (1970) has much to commend it. Newman calls his method the continued sentences technique since S responds with several sentences containing the stimulus word. Using preschool children, Newman (1970) compared the continuous word technique to the continuous sentence technique and discussed the many advantages of the latter.

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*Experiments that use a word's associations as mediators might appear to be so restricted to the idiosyncracies of specific words as to be useless; actually the experiments simply illustrate the research strategy appropriate for an educational experiment station as contrasted to the strategy appropriate for a scientist. In the scientific study of verbal learning, the scientist can test a supposedly representative sample of words (or other language units) and then generalize to the language as a whole from his sample. But a better strategy for an experiment station is to start--as in this chapter--by determining the specific words best suited to beginning reading. Once they are determined, all later experiments test that particular population of words. The point is that the idiosyncracies of certain words are of vital concern to reading engineering, and it does make sense to perform an experiment in which a treatment that gives hints or mediators pairing the stimulus and response is compared to one that does not.

The most important difference between the continuous word and the continuous sentence techniques is easily seen by comparing their association hierarchies. The hierarchies produced by the word task contain little more than nouns and adjectives. The hierarchies produced by the sentences task contain most of the same nouns and adjectives but they also contain large numbers of verbs, pronouns, adverbs, and other parts of speech. Apart from the advantages of having associative measures on these other words, the real value of sentence associations lies in the fact that the data can be scaled for such things as sequential dependencies, grammatical structure, and frequencies of regularly occurring phrases.

The continued sentences method was used to collect association hierarchies to 146 words.

Subjects. The Ss were 39 preschool children between the ages of 48 and 60 months (Mean = 55.52) who had no experience with reading. These children (17 girls and 22 boys) were randomly selected from five kindergarten classes at the Fort Bliss Elementary School. The only criterion for a child to be chosen as an S was that he be able to perform the association task by the end of one 20-minute session. Only one S was discarded for failing to do so.

Of the 39 Ss, 15 gave associations to all 146 words. The remaining 24 Ss were tested as follows: 12 Ss responded to approximately 2/3 of the words and the other 12 Ss responded to the remaining 1/3 words. It was necessary to conduct the study in this way since the mean number of testing days was 15.89 and several Ss became too tired of the task to continue. Each of the 146 words was responded to by 27 Ss.

Materials. The stimuli were 146 regularly spelled words.

Procedure. The usual instructions for the continuous word association task was given except that the child was given complete sentences as examples.

> If I say TRUCK you might say "A truck is bigger than a car." If I ask "What else does TRUCK make you think of?" you might say "A truck goes real fast on a road..."

The child was given examples until he clearly understood his task. The words were then presented separately and S was asked, "What do you think of when I say the word _____?" The question, along with the stimulus word, was repeated several times during the interval to make sure that the stimulus was foremost in the child's mind as he responded.

The E attempted to get about four sentence associations to each stimulus word. The 146 words were given in a different order for each S to minimize the effects of previous associations. The Ss responded to about 10 words per session (Mean = 10.11). In order to keep motivation high, Ss were told that they would receive a toy after each session only if they "worked hard."

Results

A total of 15,040 sentence associations were recorded for the 39 Ss, which included 80,465 words. The Ss responded with an average of 3.55 sentence associations per stimulus word. The mean number of words per stimulus was 18.92, and mean sentence length was 5.33 words.

If one compares the resulting hierarchies to those collected from children by the discrete association method (e.g., Entwisle, Forsyth, and Muus, 1964), he will find them quite similar provided he removes clang associations from the Entwisle hierarchies and function words from the continued sentences hierarchies. For example, the responses to US collected by Entwisle et al are: people, bus, we, me, go, play, be, you, them, together, family, fuss, cuss, do, dust. The responses collected by Newman are: go, be, we, my, store, you, school, do, he, me, not, out, play, want, why, all, come, they, down, family, I, make, outside, vat, together.

Results

Association hierarchies for the words are found in Appendix II. Only nouns, verbs, adjectives, and adverbs are included. No distinction was made between singular and plural forms or between different verb tenses.

These hierarchies are invaluable for designing instructional programs. For example, they suggest the sentences that should be used when the word is first introduced. More generally, the hierarchies give an indication of the meaning of the word for preschoolers.

V

SUMMARY

In this Final Report, a number of scaling studies, all concerned with the look-say-learning of words were described.

By analyzing the studies into broadband studies and first- and second-level narrowband studies, an attempt was made to spot the studies at strategic positions throughout the matrix. The next step is to found an Educational Experiment Station in Reading that will perform intermediate studies until a pattern emerges and permits the gaps to be bridged by interpollation.

Appendix I

Common Words of English with Scores on Recall, Imagery, and Association Value.

1,000 Words Scaled as to Recall, Imagery, and Association

Word	Recall	Image Rating	Association Rating
A	17	1.765	2.381
About	12	1.441	2.619
Absent	24	3.294	3.476
Accident	26	5.618	5.381
Across	11	2.794	2.619
Act	9	3.618	3.952
Add	3	3.735	4.238
Afraid	21	4.471	4.714
After	8	2.000	3.048
Afternoon	12	4.735	4.810
Again	9	2.176	2.524
Air	19	4.676	4.762
Airplane	30	6.500	5.429
Al	16	3.588	4.143
All	11	3.088	3.857
Almost	12	1.853	2.619
Along	12	1.882	2.476
Already	7	1.588	2.524
Also	10	1.412	2.810
Always	13	1.618	3.762
Am	11	1.353	2.905
Ambulance	39	6.735	5.286
An	17	1.588	2.143
And	11	1.500	2.762
Andy	31	4.147	3.476
Animals	21	6.382	6.048
Another	9	2.147	2.762
Answer	11	3.176	4.000
Any	6	1.706	2.143
Anybody	18	2.147	3.095
Anything	11	1.824	2.810
Anyway	13	1.441	2.524
Apples	27	6.735	5.571
Are	11	1.324	2.667
Aren't	5	1.353	2.524
Arm	22	6.412	5.381
Army	29	6.324	5.667
Around	14	2.882	3.095
Artist	20	5.118	5.143

Word	Recall	Image Rating	Association Rating
As	8	1.206	1.714
Ask	18	2.529	3.619
Asleep	19	5.147	4.762
At	9	1.941	2.095
Aunt	20	5.588	5.286
Automobile	50	6.324	6.238
Away	13	2.647	3.095
Awful	11	3.059	4.238
Baby	45	6.382	5.952
Back	15	5.206	5.190
Bad	20	4.029	4.810
Bag	15	5.647	4.619
Ball	21	6.706	5.857
Balloons	36	6.529	5.381
Bananas	31	6.618	5.571
Band	19	6.265	5.286
Bank	18	5.824	4.667
Barbara	33	3.588	3.905
Bark	15	5.529	4.762
Barn	16	6.559	5.286
Basket	24	6.265	4.952
Bat	19	6.441	5.143
Bath	28	5.971	5.381
Be	23	1.353	2.571
Beads	22	5.853	4.714
Bear	30	6.294	5.714
Beat	15	4.588	4.429
Beautiful	26	4.471	5.762
Because	18	1.176	2.286
Bed	19	6.588	5.857
Been	9	1.500	2.143
Before	4	2.294	2.857
Began	13	2.559	3.476
Behind	19	4.265	3.333
Believe	13	1.853	3.190
Bells	19	6.441	5.238
Best	10	2.265	3.333
Bet	13	3.471	3.905
Better	10	2.412	4.048
Beverly	35	4.059	3.810
Bicycle	35	6.500	5.571
Big	17	5.118	4.905
Bigger	17	3.618	4.286
Bill	23	5.147	4.524
Bird	21	6.324	5.619
Birthday	30	5.647	5.095

Word	Recall	Image Rating	Association Rating
Bit	13	4.147	4.143
Bite	20	4.971	4.714
Black	28	5.971	5.571
Blackboard	33	6.471	5.714
Blocks	26	5.941	4.667
Blow	20	4.735	4.190
Blue	21	6.235	5.286
Bluebird	29	5.882	4.905
Board	13	5.912	4.714
Boat	31	6.441	5.429
Bob	30	4.265	4.619
Bone	27	6.176	5.095
Book	20	6.706	6.000
Boots	28	6.471	5.143
Both	9	2.853	3.095
Bottle	18	6.500	5.714
Bought	8	3.029	4.286
Bow	13	5.265	4.571
Bowl	15	6.353	5.571
Bowwow	55	4.441	4.714
Box	24	6.382	5.333
Boy	29	5.912	6.143
Bread	13	6.471	5.429
Break	16	4.941	5.095
Breakfast	20	6.118	5.619
Bricks	22	6.118	5.238
Bridge	28	6.588	5.619
Bright	11	5.500	4.571
Bring	11	2.412	3.524
Broke	23	4.971	4.619
Brother	33	5.765	5.333
Brought	12	2.324	3.000
Brown	16	5.794	4.762
Brownie	27	5.794	5.000
Bruce	17	3.676	3.476
Brush	20	6.265	5.238
Bug	23	6.559	5.810
Buggy	28	5.824	5.000
Build	15	4.294	4.429
Building	21	6.000	5.238
Built	10	3.559	4.524
Bunny	46	6.176	5.905
Bus	28	6.353	5.238
But	29	1.441	2.286
Butter	25	6.235	5.190
Butterfly	31	6.618	5.286

Word	Recall	Image Rating	Association Rating
Button	22	5.971	5.667
By	11	1.412	2.048
Cabbage	20	6.059	4.857
Cage	21	5.912	4.810
Cake	28	6.353	5.333
Calf	15	5.941	5.048
Call	14	3.824	4.143
Came	9	2.529	3.333
Can	18	3.971	4.143
Can't	10	1.588	2.524
Candles	21	6.529	4.952
Candy	29	6.353	5.762
Cap	24	6.118	5.048
Car	27	6.618	5.524
Cardboard	28	5.882	4.762
Cards	13	6.441	5.238
Care	12	2.824	3.762
Careful	16	2.735	3.857
Carol	27	5.029	3.619
Carrots	23	6.618	5.381
Carry	22	4.088	3.905
Cat	40	6.676	5.810
Catch	14	4.382	4.095
Cathy	34	4.971	4.238
Caught	11	3.794	3.667
Cents	6	5.265	4.619
Chair	26	6.706	5.571
Chalk	23	6.029	5.238
Change	10	3.441	3.619
Charles	37	3.706	3.238
Cheese	24	6.059	5.429
Chicken	31	6.529	5.381
Children	28	6.353	5.429
Chimney	28	6.059	5.048
Christmas	41	6.353	6.000
Church	23	6.441	6.048
Circus	28	6.324	5.905
Class	18	5.500	4.667
Clay	19	5.824	4.762
Clean	19	4.500	5.095
Clear	11	4.441	4.429
Climb	19	5.088	5.048
Clock	22	6.412	5.619
Close	18	3.706	4.000
Clothes	19	6.235	5.857
Cloudy	25	6.088	5.286
Clown	27	6.500	5.571

Word	Recall	Image Rating	Association Rating
Coat	25	6.441	5.333
Cold	20	5.912	5.714
Color	12	4.676	5.571
Comb	12	6.147	5.381
Come	19	2.765	4.381
Cook	33	6.000	5.429
Cookies	26	6.588	5.571
Cool	19	4.618	4.476
Copied	13	3.765	3.857
Corn	20	6.324	4.905
Corner	19	5.765	4.619
Cost	16	3.206	4.714
Cotton	18	6.265	5.238
Could	9	1.324	2.619
Couldn't	11	1.382	2.238
Count	8	3.588	4.000
Country	22	5.471	5.286
Cousin	20	5.353	5.524
Cow	28	6.676	5.524
Cowboy	41	6.441	5.762
Cream	28	5.853	5.381
Cross	20	6.147	4.714
Cry	23	5.294	5.190
Cup	19	6.059	5.857
Curls	22	5.441	4.667
Curly	18	5.676	4.333
Cut	25	4.971	5.000
Cute	22	3.706	4.810
Dad	34	6.618	6.190
Daddy	52	6.147	5.476
Dan	21	3.618	3.810
Dance	29	6.059	4.905
Dark	20	5.529	5.762
Dave	20	4.176	3.238
Day	8	5.412	5.333
Dead	28	5.412	5.429
Dear	14	3.471	4.667
Debra	31	4.147	3.095
Desk	19	6.353	5.190
Dick	21	4.088	4.238
Dictionary	32	5.794	5.524
Did	18	1.500	2.333
Didn't	6	1.735	2.619
Died	21	4.441	5.143
Different	8	2.941	3.524
Dig	21	5.088	4.714
Dime	16	6.029	5.238

Word	Recall	Image Rating	Association Rating
Dine	14	5.000	4.762
Dinner	20	5.676	5.810
Dirt	18	5.794	5.476
Dirty	29	5.235	5.571
Dishes	27	6.294	5.857
Do	20	1.971	3.476
Doctor	41	6.412	5.429
Does	10	1.441	3.095
Doesn't	12	1.618	2.524
Dog	29	6.618	5.857
Dole	6	2.853	2.571
Doll	23	6.471	5.333
Dollars	22	6.176	5.810
Dolly	26	5.647	4.095
Don	21	4.500	4.333
Don't	19	1.912	2.476
Done	10	2.118	3.476
Donna	36	3.853	3.286
Door	19	6.412	5.429
Down	14	3.765	4.190
Draw	13	5.324	4.810
Dreamed	11	4.500	4.476
Dress	25	6.647	5.810
Drink	19	5.706	5.429
Drive	19	4.941	5.143
Drop	20	4.912	4.048
Drum	24	6.000	4.857
Dry	12	4.382	4.476
Duck	28	6.588	5.476
Each	7	2.206	2.762
Early	10	3.471	4.429
Ears	21	6.588	5.143
Easter	31	6.088	5.905
Eat	26	5.706	5.429
Ed	11	3.912	3.667
Eggs	21	6.794	5.667
Eight	15	5.324	4.619
Either	7	1.706	2.905
Electric	19	4.647	4.810
Elephant	41	6.618	5.190
Else	12	1.324	1.857
End	5	4.353	4.381
Engine	32	5.765	4.905
Enough	8	2.559	2.857
Eraser	23	6.059	5.048
Even	10	2.441	3.429
Evening	20	5.147	5.143

Word	Recall	Image Rating	Association Rating
Ever	7	1.618	2.524
Every	7	1.676	3.238
Everybody	14	3.618	3.476
Everything	17	3.118	3.286
Excuse	21	2.441	3.857
Eyes	22	6.676	5.524
Face	25	5.853	5.714
Fair	12	4.500	4.857
Fairy	26	5.324	5.048
Fall	13	5.265	5.190
Family	24	5.912	5.714
Fan	17	6.176	4.762
Far	9	3.706	3.429
Farm	25	6.206	5.619
Farmer	30	6.206	5.571
Fast	13	4.176	4.286
Fat	23	6.176	5.381
Father	36	6.265	6.000
Feed	14	5.265	4.238
Feel	11	3.088	4.524
Feet	21	6.382	5.714
Fell	9	4.353	4.333
Fence	10	6.382	4.762
Few	11	3.059	3.476
Field	10	5.765	5.190
Fifteen	12	5.206	3.905
Fight	26	5.618	4.952
Finally	12	2.000	3.524
Find	8	2.735	4.238
Fine	6	2.882	3.810
Finger	31	6.529	5.190
Finish	11	3.618	4.095
Fire	25	6.471	5.857
Fireplace	23	6.441	5.714
First	10	4.706	4.667
Fish	29	6.588	5.429
Five	18	5.765	4.143
Fix	13	4.353	4.286
Flag	20	6.235	5.476
Flew	17	4.471	4.048
Float	20	5.706	4.381
Floor	19	5.853	5.190
Flowers	27	6.647	5.952
Fly	20	6.088	5.429
Food	21	6.118	5.952
Foot	18	6.353	5.810

Word	Recall	Image Rating	Association Rating
Football	39	6.735	5.762
For	19	1.412	2.857
Forest	13	6.294	5.667
Forget	24	2.353	3.143
Forgot	21	2.353	3.571
Found	6	2.647	3.905
Fox	36	6.000	5.048
Frank	22	4.029	3.762
Friday	20	4.265	4.667
Friend	20	5.500	5.429
From	6	1.676	2.429
Front	8	3.941	4.524
Fruit	21	6.324	6.190
Full	13	4.912	4.381
Fun	17	4.176	5.000
Funny	26	3.941	4.952
Fur	16	6.000	5.190
Furniture	28	6.324	5.476
Games	21	5.000	4.810
Garage	21	6.265	5.619
Garden	24	6.147	5.714
Gave	6	2.529	3.667
George	30	4.765	3.905
Get	12	2.029	2.952
Girl	31	6.382	6.524
Give	7	3.176	4.095
Glad	13	4.000	4.238
Glass	19	6.118	5.143
Gloves	20	6.412	4.857
Go	14	3.794	4.238
Goat	29	6.324	5.095
Gobble	32	4.353	4.238
God	45	4.853	5.048
Gold	16	6.029	5.381
Goldfish	31	6.235	5.095
Gone	9	2.853	3.476
Good	14	3.206	4.952
Good-by	15	4.059	4.190
Goodness	10	2.676	3.762
Goose	18	6.382	4.857
Got	16	1.941	3.095
Grade	9	5.294	5.190
Grandfather	38	5.853	6.095
Grandma	45	5.971	5.857
Grandmother	41	6.059	5.762
Grandpa	34	6.176	5.667

Word	Recall	Image Rating	Association Rating
Grass	28	6.382	6.000
Gray	14	5.324	4.762
Great	12	3.265	4.238
Green	23	6.059	5.810
Grocery	29	5.912	5.286
Ground	10	5.676	5.048
Grow	13	3.735	4.190
Guess	10	2.853	3.857
Gun	26	6.059	5.524
Had	6	1.588	2.714
Hair	24	6.471	5.952
Half	6	4.735	3.952
Hall	9	5.882	4.762
Halloween	49	6.059	5.905
Hand	16	6.412	5.762
Handkerchief	31	6.176	4.286
Hang	22	5.176	4.810
Happy	20	5.235	5.429
Hard	14	4.529	4.905
Hardly	14	1.676	2.000
Has	7	1.735	2.429
Hasn't	8	1.676	1.762
Hat	18	6.353	5.381
Have	5	2.118	3.000
Haven't	18	1.706	2.429
Hay	23	5.941	5.095
He	16	3.324	3.952
He's	11	1.882	2.714
Head	13	6.441	5.571
Heard	7	2.412	3.095
Heart	21	6.441	5.524
Helen	24	3.853	3.333
Hello	13	3.706	4.714
Help	17	4.118	4.524
Hen	13	6.235	5.476
Her	11	3.500	3.571
Here	16	2.559	3.524
Here's	8	1.559	2.286
Hid	11	3.559	3.952
Hide	18	4.676	4.714
High	18	4.824	5.476
Hill	17	6.147	4.810
Him	13	3.176	3.857
Himself	18	2.471	3.048
His	18	2.529	3.333
Hit	21	4.824	4.476

Word	Recall	Image Rating	Association Rating
Hold	11	3.676	4.143
Hole	15	5.824	4.286
Holidays	26	4.765	5.524
Home	21	5.941	6.000
Hop	18	4.676	4.429
Hope	13	3.059	3.905
Horn	17	5.971	5.238
Horse	31	6.618	5.571
Hospital	34	6.559	6.048
Hot	16	5.529	5.857
House	29	6.647	5.429
How	13	1.794	2.381
Hundred	21	5.206	4.333
Hungry	15	4.294	4.810
Hunt	20	5.118	4.857
Hurry	12	3.882	4.143
Hurt	22	4.559	4.905
I	25	5.029	4.952
I'd	8	1.559	1.667
I'll	7	1.765	2.857
I'm	11	1.824	2.762
I've	8	1.471	2.381
Ice	24	6.471	5.714
Ice Cream	34	5.941	5.095
Idea	11	3.000	4.286
If	10	1.588	2.810
Ignorance	13	2.618	4.095
In	12	2.735	3.476
Ink	25	6.353	5.333
Inside	14	4.118	3.476
Into	12	2.471	2.810
Invited	23	2.912	3.714
Iron	20	5.765	5.095
Is	7	1.500	2.762
Isn't	17	1.618	2.381
It	8	2.353	2.714
It's	12	1.824	2.000
Jack	23	4.794	4.095
Jack-O-Lantern	42	6.000	5.571
January	29	4.147	4.810
Jean	15	4.294	3.476
Jelly	23	6.265	5.429
Jim	30	4.647	4.190
Joan	16	4.235	3.381
Joe	22	4.529	3.619
John	28	5.088	4.714

Word	Recall	Image Rating	Association Rating
Joyce	17	4.118	4.048
Judy	48	4.618	3.476
Juice	17	6.265	5.000
Jump	19	5.176	3.905
Just	9	1.676	3.048
Karen	25	4.588	3.810
Keen	18	2.000	3.524
Keep	11	2.529	3.381
Kept	14	2.176	3.286
Key	12	6.529	5.714
Kid	23	5.676	5.333
Kill	30	5.588	4.524
Kind	10	3.000	3.476
Kindergarten	49	5.265	5.238
King	31	5.971	5.571
Kitchen	29	6.059	5.762
Kite	28	5.971	5.429
Kitten	31	6.529	5.333
Kitty	38	5.647	4.952
Knew	11	1.765	2.667
Knife	24	6.471	5.571
Knocked	12	4.000	4.000
Know	11	2.353	3.571
Lady	28	5.588	5.333
Lake	12	6.235	5.429
Land	18	5.882	5.095
Larry	35	4.176	3.238
Last	8	4.353	4.381
Late	15	3.382	4.190
Laugh	16	5.647	5.667
Lay	14	3.882	3.857
Leaf	14	6.353	5.381
Learn	6	2.500	4.381
Leave	16	3.118	4.238
Left	8	3.912	4.190
Legs	21	6.559	5.810
Lessons	15	4.176	4.714
Let	8	1.588	2.571
Let's	12	1.441	2.571
Letter	13	5.971	5.095
Lettuce	19	6.235	5.476
Library	33	6.059	5.429
Light	8	5.706	5.333
Like	6	2.118	4.143
Linda	36	4.971	3.762
Line	14	5.706	4.429
Lion	19	6.676	5.667

Word	Recall	Image Rating	Association Rating
Listen	22	3.618	4.333
Little	16	4.471	4.762
Live	14	3.235	4.762
Long	12	4.588	4.857
Look	14	4.000	4.143
Loose	11	3.265	4.143
Lost	22	2.971	4.381
Lots	9	2.971	3.857
Loud	8	4.529	5.095
Love	29	4.765	6.000
Lovely	13	3.912	4.810
Lunch	17	6.147	5.810
Machine	21	5.676	5.000
Mad	20	5.118	4.571
Made	13	2.588	3.381
Mail	13	5.912	5.524
Make	7	3.706	3.476
Mamma	44	6.471	5.333
Man	15	6.088	5.667
Many	18	3.735	3.857
Marbles	36	6.588	4.524
March	15	5.735	5.000
Mary	25	5.206	4.476
May	11	3.382	4.238
Maybe	11	1.706	2.524
Me	15	4.765	4.762
Mean	17	4.147	4.810
Meat	23	6.176	5.810
Men	20	5.882	5.714
Merry-Go-Round	45	6.118	5.333
Met	7	2.794	3.095
Mew	15	3.529	3.905
Mice	26	6.118	5.143
Middle	11	4.706	4.143
Might	12	1.912	3.238
Mike	20	5.206	4.143
Milk	29	6.618	5.571
Mind	11	3.706	4.619
Mine	8	3.118	5.381
Minute	14	4.000	5.333
Miss	11	3.971	4.667
Monday	13	3.647	4.571
Money	21	6.353	5.810
Monkey	39	6.618	5.524
Month	12	3.971	5.190
Moo	23	4.471	4.905

Word	Recall	Image Rating	Association Rating
Moon	28	6.559	6.000
More	12	2.676	3.429
Morning	18	5.618	5.143
Most	10	2.500	3.095
Mother	36	6.559	6.429
Mouse	32	6.353	5.476
Mouth	16	6.353	6.190
Move	15	4.118	3.762
Mr.	25	3.412	5.000
Mrs.	26	3.647	5.143
Much	4	2.471	3.571
Mud	24	6.206	5.286
Music	12	5.941	5.714
Must	9	1.559	2.714
My	16	2.265	3.286
Myself	20	4.882	4.429
Name	15	3.647	4.333
Nancy	46	4.176	3.619
Near	14	3.118	4.048
Nearly	8	2.029	2.714
Neck	20	6.324	5.095
Need	7	2.529	4.000
Nest	22	6.059	5.048
Never	7	1.941	3.476
Newspaper	27	6.118	5.714
Next	12	2.500	3.095
Nice	17	2.676	3.905
Nickel	26	6.265	5.048
Night	10	6.059	6.000
Nine	17	5.912	3.810
Noise	13	4.559	5.190
Nose	28	6.471	5.048
Not	10	1.853	2.429
Nothing	7	2.794	3.810
Now	8	2.000	3.667
Number	12	4.676	5.143
Nurse	30	6.235	5.238
Nuts	22	6.529	5.381
O'clock	17	3.147	3.524
Ocean	31	6.706	6.143
Of	3	1.176	1.762
Off	12	2.853	3.286
Oh	13	1.912	3.238
Oil	18	6.147	5.619
Old	22	5.618	4.952
On	9	3.000	2.905
Once	11	2.147	3.381

Word	Recall	Image Rating	Association Rating
One	17	5.588	4.619
Only	12	2.206	2.857
Open	10	4.382	4.381
Or	11	1.294	2.667
Orange	30	6.382	5.429
Other	10	2.294	3.048
Ought	10	1.265	1.810
Our	15	2.588	2.952
Out	8	3.088	4.048
Outdoors	23	5.471	5.000
Outside	22	4.824	4.619
Over	16	2.735	3.429
Overshoes	18	5.265	4.524
Own	10	2.353	3.381
Page	9	5.324	4.905
Paid	7	3.706	3.905
Pail	16	5.735	4.286
Paint	22	6.029	5.048
Pair	15	4.941	4.143
Pants	28	6.412	5.714
Papa	39	6.029	5.714
Paper	24	6.118	5.381
Parade	22	6.176	6.000
Park	26	6.471	5.381
Part	8	3.618	4.190
Party	28	6.353	5.667
Pass	9	4.441	4.381
Paste	16	5.559	4.333
Patty	22	4.324	4.286
Paws	22	6.059	5.095
Pay	11	4.088	4.905
Peanuts	31	6.500	5.286
Pen	14	6.471	5.476
Pencil	30	6.412	5.714
Penny	27	5.882	5.000
People	30	5.941	5.619
Pet	25	5.588	5.905
Pete	26	4.059	3.619
Pick	19	4.765	4.143
Picnic	36	6.147	5.381
Picture	20	6.176	5.429
Pie	23	6.618	5.762
Piece	17	4.647	4.238
Pig	29	6.500	5.571
Pink	17	5.882	4.810
Place	12	3.559	3.619
Plane	19	6.382	5.286

Word	Recall	Image Rating	Association Rating
Plant	11	6.324	5.238
Play	20	4.824	5.619
Playhouse	30	5.941	4.476
Please	20	2.176	3.714
Policeman	44	6.500	6.000
Pond	7	6.324	4.857
Pony	33	6.324	5.429
Poor	18	4.824	4.905
Popcorn	46	6.412	5.286
Porch	22	5.853	4.619
Post Office	35	6.147	5.571
Postmaster	27	4.824	5.000
Potatoes	37	6.588	5.571
Presents	23	6.118	5.476
Pretty	25	4.235	5.143
Print	13	4.765	4.571
Prize	13	5.235	5.476
Program	11	4.441	4.571
Pull	20	4.706	3.810
Pumpkin	43	6.294	5.429
Puppy	38	6.559	6.000
Purple	25	5.471	4.190
Push	28	4.529	4.381
Put	10	2.794	3.381
Quiet	10	3.559	4.143
Quit	6	2.912	4.238
Quite	14	2.000	2.571
Rabbit	30	6.647	5.810
Radio	28	6.588	5.619
Rain	16	6.353	5.619
Ran	5	4.294	4.095
Rat	33	6.500	5.381
Ray	14	4.529	4.857
Read	17	4.206	5.048
Ready	10	2.353	3.762
Real	15	2.412	3.333
Really	9	1.618	2.571
Recess	26	4.647	4.810
Red	17	5.971	5.143
Reindeer	45	6.265	5.381
Remember	19	2.588	3.952
Rest	10	4.000	4.667
Riddles	18	3.706	4.571
Ride	15	4.794	5.190
Right	6	3.765	4.952
Ring	20	6.294	5.190
River	21	6.088	5.905

Word	Recall	Image Rating	Association Rating
Road	24	6.265	5.048
Robert	22	4.235	4.190
Robin	21	5.912	5.286
Rock	27	6.206	5.190
Roll	18	5.412	5.190
Room	19	5.941	5.619
Rooster	30	6.118	5.667
Rope	19	6.324	4.952
Roses	26	6.618	5.381
Round	10	5.559	5.381
Rubber	18	5.853	5.571
Rug	22	6.412	4.952
Run	20	5.353	4.381
Ruth	34	4.176	3.476
Sad	18	4.706	5.333
Said	4	2.000	3.333
Sail	12	5.794	5.381
Sally	32	3.647	3.333
Sam	23	4.735	4.524
Same	9	2.471	3.429
Sand	17	6.147	5.619
Sandra	35	4.382	3.810
Sang	13	3.324	4.476
Santa	51	6.647	6.000
Santa Claus	57	6.824	6.095
Sat	10	3.559	3.857
Saturday	24	4.088	5.381
Saw	15	5.029	4.857
Say	15	2.294	3.476
Says	9	1.882	2.810
Scared	20	4.294	4.095
School	36	6.324	5.905
Scissors	21	6.529	5.048
Scooter	37	6.118	4.762
Seat	13	5.441	4.333
Second	2	4.176	4.095
Secret	11	3.118	4.476
See	18	3.353	4.143
Seeds	17	5.912	4.619
Sell	7	3.882	4.143
Send	11	3.118	3.714
Sent	9	2.265	3.667
Sentences	14	4.441	4.714
Set	13	3.500	3.381
Seven	17	5.765	4.619
Shall	11	1.471	2.476

Word	Recall	Image Rating	Association Rating
She	21	3.529	4.381
Sheep	22	6.206	4.714
Shepherds	20	5.765	4.476
Shine	16	4.706	4.571
Ship	23	6.382	5.762
Shirt	22	6.265	5.095
Shoes	26	6.529	5.476
Shoot	37	5.176	5.000
Shop	20	5.500	5.095
Short	11	5.059	4.905
Shot	31	5.294	4.952
Should	2	1.382	2.714
Show	18	4.853	5.190
Shut	11	3.882	4.143
Sick	23	5.235	5.286
Side	9	4.000	4.095
Sing	13	5.118	5.095
Sister	29	5.676	5.143
Sit	17	4.500	4.524
Six	22	5.588	4.524
Skates	31	6.412	5.190
Skip	16	4.912	4.810
Sky	18	6.118	5.952
Sled	18	6.088	5.048
Sleep	18	5.353	4.762
Sleepy	24	5.029	4.571
Sleigh	22	6.147	5.048
Slid	10	4.294	4.048
Slide	11	5.618	4.810
Small	16	5.176	5.190
Smell	18	4.676	4.190
Snake	35	6.559	5.524
Snow	23	6.588	5.810
So	9	1.353	2.333
Soft	16	5.176	5.381
Sold	9	3.324	4.190
Soldiers	23	6.412	5.905
Some	6	2.118	3.190
Somebody	20	3.000	3.286
Someone	11	2.971	3.000
Something	8	2.471	2.952
Sometimes	14	1.706	2.619
Song	9	5.029	5.238
Soon	8	2.176	2.762
Sorry	20	2.971	4.048
Spade	12	6.176	4.857
Spell	11	3.529	4.000

Word	Recall	Image Rating	Association Rating
Spin	8	4.235	4.333
Spinach	35	5.765	5.333
Spot	22	5.382	4.667
Spring	15	5.824	6.143
Squirrel	23	6.471	5.048
Stand	12	4.618	4.571
Star	20	6.147	5.333
Start	14	3.441	4.476
Station	19	5.206	4.619
Stay	13	2.294	4.000
Step	16	5.441	4.762
Steve	37	3.971	3.476
Stick	25	5.912	4.619
Still	9	2.618	3.333
Stockings	35	6.235	4.857
Stoop	19	3.882	4.476
Stop	23	4.706	4.810
Store	14	6.235	5.524
Story	16	4.441	5.143
Stove	20	6.118	5.952
Straight	7	4.941	5.095
Street	24	6.118	5.238
String	15	6.088	4.857
Strong	15	5.029	5.238
Stuck	20	4.235	3.667
Study	8	5.324	4.667
Such	10	1.412	2.190
Sue	36	4.559	4.048
Sugar	26	6.176	5.238
Suit	17	5.912	5.143
Summer	17	5.853	6.333
Sun	24	6.676	5.762
Sunday	29	4.706	4.714
Sunshine	19	6.088	5.143
Supper	20	5.676	5.810
Supposed	15	1.471	2.571
Sure	12	1.882	3.286
Surprised	20	4.353	3.524
Susan	39	4.559	3.714
Sweater	20	6.235	5.190
Sweet	16	4.559	5.571
Swim	26	6.618	5.286
Swing	15	6.088	4.333
Table	18	6.324	5.286
Tablet	22	5.853	4.524
Tadpoles	27	5.794	5.333

Word	Recall	Image Rating	Association Rating
Tail	12	6.059	5.190
Take	10	2.941	3.762
Talk	17	4.294	5.429
Tall	7	5.353	5.333
Tardy	12	3.441	4.286
Taught	9	2.882	4.381
Teach	23	4.294	5.143
Teacher	30	5.882	5.524
Tear	20	5.765	5.000
Teeth	26	6.441	5.381
Telephone	23	6.176	5.143
Tell	12	2.676	3.190
Ten	22	5.853	4.476
Test	18	5.265	5.333
Than	8	1.471	1.857
Thank	13	2.794	3.810
Thankful	11	3.441	3.286
Thanksgiving	40	6.412	5.810
That	12	1.794	2.667
That's	2	1.471	1.952
The	14	1.353	1.667
Their	8	1.765	2.476
Them	5	2.412	3.048
Then	7	1.735	2.619
There's	4	1.441	2.190
These	6	1.765	2.619
They	6	2.676	2.857
Things	15	3.500	3.095
Think	11	2.912	4.095
Third	9	4.529	3.810
Thirsty	14	4.794	4.905
Thirty	16	4.971	3.667
This	8	1.647	3.000
Those	11	2.088	3.143
Though	5	1.294	2.571
Thought	9	2.588	3.952
Three	19	5.353	4.429
Threw	6	3.882	3.524
Throw	15	4.882	4.714
Thursday	19	3.088	4.667
Tickets	20	6.176	5.286
Tie	17	6.147	5.143
Tiger	21	6.265	5.238
Tight	10	4.324	4.810
Till	9	1.853	2.286
Time	10	3.912	4.714

Word	Recall	Image Rating	Association Rating
Tiny	17	4.824	4.524
Tired	12	4.471	3.952
To	13	1.441	2.810
Toad	14	6.147	5.048
Toast	24	6.088	5.476
Today	14	3.618	5.333
Toe	18	6.147	5.333
Together	20	4.176	4.238
Told	12	2.235	3.476
Tom	20	4.824	4.095
Tomorrow	26	3.353	4.476
Tonight	17	4.265	4.476
Tonsils	37	5.618	4.762
Tony	31	3.706	3.810
Took	10	2.676	3.333
Tools	31	6.265	5.286
Tooth	27	6.294	5.762
Top	14	5.382	4.238
Tore	14	4.441	3.762
Touch	20	4.647	4.571
Towel	18	6.059	5.333
Town	21	5.529	5.095
Toys	24	6.235	5.714
Track	16	5.853	4.667
Tractor	28	6.441	5.190
Train	24	6.588	5.190
Tree	17	6.471	6.095
Tricks	16	4.765	4.429
Tricycle	36	6.471	5.333
Trip	19	5.088	5.571
Trousers	26	6.294	5.286
Truck	21	6.382	5.714
Trunk	15	5.794	4.238
Try	15	2.324	3.571
Turkey	36	6.353	5.524
Turn	16	3.588	3.762
Turtle	23	6.294	5.143
Twelve	13	5.500	4.667
Umbrella	34	6.088	4.857
Uncle	34	5.441	5.952
Under	15	3.412	3.905
Until	11	1.559	2.714
Up	14	3.676	4.762
Upon	12	2.294	2.524
Upstairs	34	5.059	4.667
Us	12	3.500	3.476
Use	10	2.294	3.429

Word	Recall	Image Rating	Association Rating
Vacation	24	5.412	5.143
Valentine	35	6.235	5.476
Vegetables	19	6.147	6.095
Very	13	1.441	2.429
Vicki	33	4.000	3.524
Virginia	36	4.206	4.667
Visit	10	3.353	3.810
Wagon	25	6.235	5.238
Wait	9	2.824	3.905
Wake	12	3.618	4.000
Walk	21	5.265	5.048
Wall	9	5.882	4.810
Want	5	2.529	3.429
War	24	6.353	5.952
Warm	21	4.324	5.238
Was	5	1.500	2.190
Wash	24	4.853	5.095
Wasn't	6	1.500	2.524
Watch	18	6.147	4.857
Water	25	6.471	5.905
Way	8	2.382	2.810
We	18	3.235	3.952
We'll	16	1.735	2.286
We're	8	1.912	2.667
Wear	15	3.500	4.571
Weather	17	4.735	5.190
Wednesday	13	3.588	4.762
Week	11	3.559	5.000
Well	13	4.912	4.286
Went	14	1.912	3.952
Were	5	1.618	2.190
Wet	21	5.941	5.333
What	4	1.882	2.048
What's	6	1.647	2.238
Wheels	20	6.147	5.190
When	16	1.647	2.667
Where	6	2.000	2.238
Which	17	1.353	2.095
While	6	1.559	2.000
Whistle	21	5.941	4.857
White	12	5.853	5.286
Who	10	1.824	2.238
Whose	7	1.412	2.048
Why	8	1.824	3.000
Wild	18	4.735	4.714
Will	11	3.000	3.952
Wind	17	5.912	5.476

Word	Recall	Image Rating	Association Rating
Window	21	6.471	5.476
Winter	10	6.206	5.905
Wish	21	2.941	4.286
With	7	1.882	3.000
Without	13	2.176	3.000
Woke	8	3.500	4.000
Wolf	26	6.353	4.857
Woman	23	6.059	6.190
Won't	11	1.941	3.095
Wonder	20	2.382	3.619
Words	6	5.029	5.048
Wore	17	2.735	3.190
Work	22	5.088	5.429
World	20	5.765	5.429
Worms	22	6.382	5.714
Would	18	1.382	2.571
Wouldn't	10	1.500	2.476
Write	7	4.618	4.714
Written	10	3.765	4.143
Wrote	10	3.706	4.381
Yard	9	5.941	5.238
Years	10	3.265	4.524
Yellow	18	5.676	5.048
Yes	10	2.765	3.571
Yesterday	26	2.912	4.048
Yet	3	1.588	2.095
You	13	3.676	4.190
You'll	10	2.088	2.143
Your	8	1.912	2.952
Yours	12	2.206	3.048
Zoo	28	6.324	5.905

Appendix II

Hierarchies of Associations to 146 Common, Regularly Spelled Words.

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	AGO	AM	AN	AND	ANN	AS	ASK	AT	BACK	BAD
30	go			go		go	mother			
25	long		Ann							boy
20		girl			play					
15	time				go			school, go	go	not
					name			store	get backwards	girl
10		go good	name, go apple			get				
		little		store	not	home	go	mother		
		boy		like, play		store	say, out		up, car	
		not	eat, get dog	friend father come	girl, love				brother	
5		dog, arm	out, girl	ball, home sister	Marie, see	school good, up	something play	today	itch	toy
4	car	Ann, up put, get house	mother brother little, aunt	Ann, daddy mommy brother	dog	mother play, leave	father come	house, add	people, sit boy, want	good, play spanking
3	goat, get mother	baby, here	orange know, play store	hand out, fly movie	brother house, toy aunt, know work	say, toy not	outside mommy piece, get	eat, farm hat, home	hurts watch, ride, walk scratch	bed, dog get, take suppose
2										
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	BE	BILL	BLACK	BOB	BOY	BRING	BROWN	BUT	CAME	CAN
					play 37			go 37		
30										
25					go					
20								not	home school	
	bee									
	B	name play		name						go
15										
					girl					
	good			Bobby						
10		house		play, go	school			outside like	house	
	go			boy		back				
	not, name want	go, name	not, shoe crayon, get		like	something home	dog		store, play	can
		boy		work	work		brownies	play		play
				like		toy, boy			over, see	
5	start sting		pencil, like	house	outside brother mother football	mother, go	not, cow horse	new, home		up, open food, dog
		bed, Billy						brother		
4	bumble very, nice girl		shirt	school, up car, want outside	get, want down, out	shoe	shoe, get	button school store	today, get	out, buy mother get
		back, home					there, hair			
3	mother boy, eat	mother uncle, like build, work come, say	chair, cow color, hair horse pants people	there, get mother drive	house, toy name, wear	car sandwich	color, cat enough chair paper people piano	out, but name, toy buy, say	back, here clean, dog clother friend mother	not, one milk, put mommy climb
2										
1										

Number of Responses	CHILDREN	CLOSE	COLD	COW	CUT	DAN	DAVE	DICK	DID	DIDN'T
	school 36 go 35	door 53		milk 35						go 33
30	play									
25						go				
20			outside			play	name Davie go	name, go	go	
		clothes		get						
15				go				play		
10		window	not hot ice mother		like	like, name	David outside Crocket		something not	
	eat, like		get	give farm out, eat drink hay	meat, paper	Danny school boy	new, play		store	store school
5	not, out outside house, shoe	wear mouth, up	go wear	not	not finger grass	outside friend not	toy	out, boy Dicky, toy	mother today, work school	mother, up sister, out home, baby father, Dan
4	come, get wear	not, get mother, go		ride, walk want, live people make over run	knife, piece something	Daniel	brother work, get friend	come, work	brother buy new, bike get, tell father	come, ride want, know today play
3	bed, dog kid, run	closet, put night, cold father, eat like, shut	freezing warm, out coat, snow water, day winter, like school want		steak, out table, eggs papercutter scissors	inside father house, bike	father, up mother table, new fight, men like, dog boy	outside Dickary Dickie teacher like, up little		
2										
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	DIE	DON'T	DOWN	DRESS	ED	EGG	FIRE	FIVE	FOOD	FUN
				wear 36					eat 52	
30			go		go					
25										
20					play	eat	house			
15			get	girl		cook			good	
	not	go					go	year	like	play go
10	go		up car boy	up put mother boy, go clothes	name Eddie house boy	bird	out, there burn up, match catch, see start, light	old	not	want not
5	like, want dye	touch off, take	fall, put off not, look ground	get pretty	up outside	not, crack go out, get break	not	six, two one there, go not	mother table, go very, dog	funny, dog friend like
4		there, say bad, chair	drive, play	party, hurry	father, toy school, get friend	kid, make mother	cook, five came	four, three	morning too, buy get, want	outside
3	dead, dog hair, men mother father, get	school something outside	downstairs landing people, see take, hold	mommy shoe, take want	put, work	before, lay scramble breakfast like, take	something truck, year play, farm father, old	only apples fingers friend number sister	breakfast dinner, fix lunch meat	brother out, house school ride
2		out, not, use bike, ride door, buy know, play				pick, up			people make	
1										

Number of Responses	GAVE	GET	GO	GOT	GREEN	HAD	HAS	HAT	HE	HELP
								wear 48		
30										
25									go	
20	toy	go	car		grass					
15						toy	go	father		
10	friend		store	toy			toy		not store come	get mother up
	present away, not	toy	run somewhere	something	dress leaf mother there grow	big	come dog	daddy work	boy, toy	want
5	dog	out, new dog, store	home, play mother	new, go	shoe, see house	dog, hat	school store, car	go	back, play outside house	there, go need like
4	mother back	get	outside bed, house	car, name	tree, get	brother this, they boy, cow fun	mother friend, not	lost, lots little, cold	good little	brother find, fire people
3	father sweater want	a lot, ball bike, play mother fix	very, fast people good, want school	candy, cat god, like school	door	piano like, put	something bike, table	outside there, boy coat, head put	guy, home look, see	there, car clean, bike shoe, trap stop, take
2										
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	HE'S	HIM	HIMSELF	HOPE	HOT	HOW	I	IF	I'D	I'LL
30		go					go			
25				go						
20								go		
15			go		get		see play		go	sick
10	go	play	play	get come	not	go, make	dog	not		not
5	house play something man coming	outside store very, see	alone	home school	stove, cook very, food outside clothes fire	get, know something house	get not, store school	get, like something mother play	play, get mother like up, come hide	brother mother go
4	good, swim father	mother buy	dog, hit me, see	mother	cold, chair enough like	down, toy climb	outside eye	make	big, clean room, store, toy school	dog
3	not, out bad, boy brother	come, here friend want, work	school very, work name	new, dad dog, time today, play wish	potatoe mother something	outside mother dog, tree	bird, love person something	here, out good, cow home, stay	girl, keep swing today	very, cat she, like see, take
2	girl, dog car, steal				dog, sun touch	eat, fix try	girl	horse school store		
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	I'M	IS	IN	IT'S	IT	I'VE	JACK	JANE	JIM	JUST
			go 37				go 35			
30						get			go	
25								go	name	
20			house				box	girl		
15	go							name		
			out				out, up			
10	up, girl	go	let	outside	outside		beanstalk	Janie, play	play	get, play
			inside	day, today			down come	school	boy	go
		not, good	door, get		go			make		
				go						
	boy	get, friend		not, rain	not, good girl	new, store	back, get jump	there, up	school, get outside	
5	play	home	room	very, cold dog	cat, day get	dog	name, hill Jill	mother		home, like
4	down, baby mother policeman make	father, toy horse, dog wood, man play		good, hot boy, house	rain	something shoe	bed, boy climb, do	out, store Tarzan	friend, like store, ride Jimmy	down, baby up, judge minute
3	dog, man good, get	outside piano today come	father, toy mommy window	over, then up, warm time, snow	little, nice boy, name like	little, toy school home	daddy, pop house mother	back, bed dog, friend house, toy	army, bike father, up not	little, sit
2			store, box come, put dog, see				o'lantern school water, pick	work		
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	KING	KITTEN	LAST	LAW	LESS	LET	LIKE	LITTLE	MADE	MAE
						go 42				
30					go					
25									maid	go
20		cat			let					play
15	go									
	wear	go			home					
	live	play			more				house	name
10	castle	eat			come					outside
	crown	house	one, get		toy	play	ride	boy	mother	mother
		dog, like mother	go			come	not very	not	something	house
			line				big, dog		cake	sister
	not, out	bring		say, get	school		toy, go			come
					store	friend	like	get	boy, go	girl, friend
5	come, see	big	not	there						school
	get	meow		go		dog		play	up	
4	big, palace	food	couple, day	police	up, dog	cat, house	much, play	big, house	bed	help
	boss	mommy	more, year	policeman	mother	letter, get	mother	sister, go		
			school	catch	get	say	people	like, want		
3	old, pretty	little, bite	something	father, no	old, house	something	friend		clean, boat	back, home
	real, horse	scratch	time	not, walk	taller	girl, wear	cat, see		car, cooky	flower
	knight, sit	feed, live	man, night	good			house		school, pie	store, toy
2	people	walk	teacher							
	work		threw							
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	MAT	ME	MEN	MIKE	MILK	MISS	MORE	NAME	NO	NOT
					drink 43				not 55	
30		go				miss				
25	go		work							
20	play			play	cow					knot
15				name			get		go	tie
			car	go			want			go
			drive			Mrs.	toy			
10	name		go	boy	mother		give		mother	out
			store						say	touch
		give, play				name			touch	
		store						get		get
		toy		mother	not, come				get, tell	dog
5	there	friend	up, get	out	buy, go		potatoe	mother		baby, boy
	house		boy		get, put			know		say, take
	store, like									
4	dog, home	brother	father	Michael	people	dog, house	there, milk	game, want	know, want	brother, up
		get			give	missy, go	cooky			good, shoe
3	outside	not, home	army, eat	little, dog	out, glass	there, ball	thing	paper, not	outside	something
	father		home, food	cousin, get	good, lunch	get, see	ever, stuff	good, baby	brother	play, know
	good, floor		house	word, work			people, one	piece	children	sister, stuff
	mother			store, like			three, like		daddy, not	better
2	school			school			water, go		stuff, play	mother
	music						say			
	come, buy									
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	OH	OLD	ON	OVER	PASS	PAT	PET	RABBIT	RAN	RAT
				go 41			dog 37	hop 35		
30										
25										
20						name				
15	go	not	turn	house	house		cat	eat carrots	house home	
			put	jump			pet			
10			get		ground	play	get	bunny	away	not
					go, light	go	doggie, go			house, eat
			go, table		not	dog				
	like	house	car, horse		whole, car	girl, like				there, cat
		year	light, water					ear, tail	boy, back	
			off	cow				get, see		
5	name	mom		boat, moon	lot, red	get	little, like take	white	mother people	outside dog, hole
		see, want								
4	very, daddy people, put	mother toy, young		hill	food, friend	friend, cat mother toy, boy	good, farm elephant not	long, tree catch, egg pet, like	around school, go like	mouse
3	good, ball circle, play store	people, up lady, get	not	overboard overalls out, there chair, rope	out, past up, green	brother, up Patty, pet take	kitten rabbit name	basket Easter farm	down, fast real, race brother sister, get	chase, out food, up get, go like, see
2				people, cat bridge, run come, want						
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	RED	ROOM	ROSE	RUN	SAM	SAW	SEE	SHE	SMILE	SO
								go 34		
30					go					what 29
25		sleep								
20			roses			wood				go sew not
15		go			play				laugh	
			go	fast		sawing				
	color		play		work, name climb		go		when laugh	
10		bed	grow, pick name, like			boy	bird	girl	not	mother
	get	not	flower girl mother	brother	store	like		like dog	boy want	
	dress	play		like, want	left		up, dog sky	outside play	mother picture	
5	like	two, house up, people toy	garden get	race	mother		cat	mother, go house, buy come, not	friend, like funny, face	clothes dress
4	crayon paper shoe		out, make	go, get	there today house	Dad, saw see-saw cut, go	father, sea something get	store		outside home, eat store, like
3	reddish hot, house mother pants, put shirt, see	brother teacher big, get clean	outside people, up house, boy rosie	outside home, back friend, not school	home, ride school, get leg, like	father, up piece, big just, bird very, two	elephant shoe	inside pretty	brother something time, give thank, say toy, get	something play, sell big, come say, get up
2										
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	STATE	STEP	STILL	STOP	STORE	TAKE	TED	TELL	THAN	THANK
					buy 48 go 35					
30										
25		up								
		go								
20				car					bigger	
				light			Teddy, go			
15	live						bear	go		
							play			
		down		red						
			go	sign	food, get	toy		not		say
		stairs			mommy					
10	United, go				not		name	tell	there	
				when	groceries	go		teacher		
			sit, steal	go			outside	want	go, more	
								story		
	stay	take	down, there				toy	father		
		outside						mother		
		walk		there						new, toy
					meat					
5			car, stand	fast, come	mother	not	brother	friend		mother
					like		friend			
							work			
4	get	inside	here, quiet	mommy		friend	mother	daddy	not, toy	house
		out, say	daddy	toy, run		store		throw	better	sister
	new	get, run		get						
3	play	airplane	eat, want	here, bike	candy, egg	something	out, shoe	candy, get	little, thing	brother
		father, one		ready, say	clothes	away, back	daddy, get	rock, time		something
		boy, house		policeman	children	out, little	help, like	something		not, get
		mother		man	stuff	school, get				
2		hole, want				thing, bike				
		room				want				
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	THAT	THE	THEM	THEN	THESE	THING	THIS	THREE	TIME	TOLD
30				go 41					go 36	
25			go							
20		go								not
15									school	mother
				get				one	get	
10	girl	man		play come	pick		go	two		go
	go	farm	play		up, toy	toy	toy	three		
		dog, table house	give, see		mother, go day, want like	new, thing	day	old	up	brother
		mother	outside				get	see		story
	not, boy	cat		outside		big		chair, come	mother	out, get
5	over, up like thing, come	chair, move farmer		store	one	not, there get	thing	come	o'clock there clock outside	teacher
4	house, car scratch horse, here	away, not out	people, up store, out those, get good	piano, out school, not home, toy take, name	outside, eat chair, not	bird, give see	brother play	green, baby brother after, dog number	out, look bed, bomb supper	sister, buy like
3	mother move	over, five flower, get door, cow kitchen	inside house, look teaching	house, dog music, see fall, pick	make, good buy, pretty touch, very people, new	good something	outside, up brother friend, dog	years, go people, car	our, eat	wear, car play, toy up
2	dog, pick garbage get	horse					girl, year cat, not	sister, not		
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	TOO	TOY	TREE	UP	US	WE	WEEK	WELL	WENT	WHEN
	two 35	play 56		go 50	go 36	go				go
30										
25							go			
20	go		grow	down			day		store	come
15		not				play		not, sick		
10	after		climb like	put, see			weekend last, weak seven	get	school	get home
	one		apples leaves	air, sky look	store school	school	get	now father	home mother	store
		kids	up		play, want	love good	school		buy	
		baby, get house	down, chop mother	plane, fly	not, out		six not	today, like		school windy, out
5	mommy	mother outside boy, buy brother	water, go	hill		together something store, dog	off, next	go, play	toy, get	wind, back
4	three, like house, play school	let, want	off, plant pull, want	get	come	outside get	friend, ten eight, say saturday			outside girl
3	there, old people, try years want	away, put bring, up like, come over, car	orange, seed, get big, bird give, eat out, two	ladder, car moon, bird jump, run play, not	outside together family say, make	somewher house, not people, buy park, walk come, very here	sunday there, five more, new two	brother home, out good hospital mother	somewher there, dog town, want	inside then, little father something house blow
2		go								
1										

HIERARCHIES OF WORD ASSOCIATES

Number of Responses	WHICH	WHITE	WILL	WISH	WITH	YES				
	witch 39									
30			go		go					
25										
20						go				
			do							
15				bone						
	one, go	people								
			come, play							
10	want		home			play				
						say				
			car, store wheel	go	dog, friend	mother				
	pick	there, hair		birthday						
	today			merry	buy, come	up				
5	know	get	not, get say	christmas	boy mother	know, want				
4	holloween mother	shoe, see toy, snow	want	cat, dog	brother thing, play like, walk	not				
3	house, fly name, play	black color crayon paper paint	outside bike, park daddy	here, baby happy, out hangers toy, Xmas	outside, up big, little daddy, girl mommy sister school something	outside cookie, put house, like store swim				
2										
1										

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